Application Note AN0026

4-Hour ROM AGPS Extension

For

Venus6、Venus 8 GPS Receiver

Ver 0.3

February 19, 2014

Introduction

The 4-hour ROM AGPS option for the SkyTraq GPS receiver firmware allows users to download current 4-hour ephemeris data to GPS system which will speed up position fix when there is no usable ephemeris available.

SkyTraq has setup FTP servers which keep current effective 4-hour ephemeris data available for download.

Message Flow of 4-Hour ROM AGPS Download

ROM AGPS Download command will launch a 3-step procedure: The first step is to ftp a 4-hour ephemeris data from SkyTraq FTP server to a local Host. The login information of the ftp server: agps.skytraq.com.tw username: skytraq password: skytraq, directory /ephemeris and use binary mode to download file Eph_4_Rom.dat. The second step is to issue a AGPS warm start to GPS receiver. The third step is to set this 4-hour predicted ephemeris data to AGPS receiver. It is elaborated as below.

- The Eph_4_Rom.dat contains predicted ephemeris of 32 satellites each wrapped with binary command 0x41 header bytes, size bytes and ending bytes. The total byte number of each satellite is 94 bytes.
- Users need to get the UTC week number to issue the warm start
- PC then sends the 4-hour ephemeris to GPS receiver satellite by satellite, that is 94 bytes by 94 bytes. The Eph_4_Rom.dat is consisted of 94*32 bytes of data. Therefore, the user reads 94 bytes of data from Eph_4_Rom.dat and sends to GPS receiver. After receiving ACK, the user continues to send the next 94 bytes of data until all data has been sent. Please refer to Figure 1.

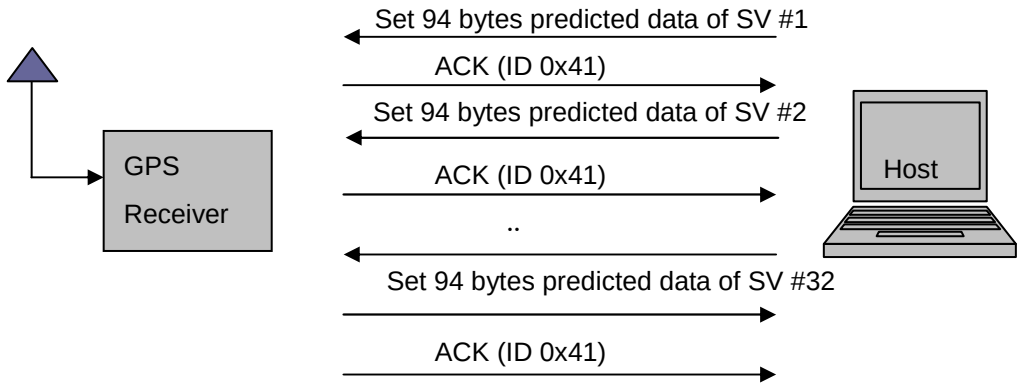

Figure 1

- The format of ephemeris data of each satellite of the 4-hour ephemeris is as table below.

Bytes	Name	Example(hex)	Description	Type
1	Binary head byte	A0	Binary message start sequence byte	UINT8

			#1	
2	Binary head byte	A1	Binary message start sequence byte #2	UINT8
3	Binary size byte	00	Binary message payload length byte #1	UINT8
4	Binary size byte	57	Binary message payload length byte #2	UINT8
5	Binary command ID	41	Binary message command ID	UINT8
6-7	SV id	0001	Satellite id	UINT16
8	SubFrameData[0][0]	00	Eph data subframe 1	UINT8
9	SubFrameData[0][1]	00	Eph data subframe 1	UINT8
10	SubFrameData[0][2]	00	Eph data subframe 1	UINT8
11	SubFrameData[0][3]	00	Eph data subframe 1	UINT8
12	SubFrameData[0][4]	00	Eph data subframe 1	UINT8
13	SubFrameData[0][5]	00	Eph data subframe 1	UINT8
14	SubFrameData[0][6]	00	Eph data subframe 1	UINT8
15	SubFrameData[0][7]	00	Eph data subframe 1	UINT8
16	SubFrameData[0][8]	00	Eph data subframe 1	UINT8
17	SubFrameData[0][9]	00	Eph data subframe 1	UINT8
18	SubFrameData[0][10]	00	Eph data subframe 1	UINT8
19	SubFrameData[0][11]	00	Eph data subframe 1	UINT8
20	SubFrameData[0][12]	00	Eph data subframe 1	UINT8
21	SubFrameData[0][13]	00	Eph data subframe 1	UINT8
22	SubFrameData[0][14]	00	Eph data subframe 1	UINT8
23	SubFrameData[0][15]	00	Eph data subframe 1	UINT8
24	SubFrameData[0][16]	00	Eph data subframe 1	UINT8
25	SubFrameData[0][17]	00	Eph data subframe 1	UINT8
26	SubFrameData[0][18]	00	Eph data subframe 1	UINT8
27	SubFrameData[0][19]	00	Eph data subframe 1	UINT8
28	SubFrameData[0][20]	00	Eph data subframe 1	UINT8
29	SubFrameData[0][21]	00	Eph data subframe 1	UINT8
30	SubFrameData[0][22]	00	Eph data subframe 1	UINT8
31	SubFrameData[0][23]	00	Eph data subframe 1	UINT8
32	SubFrameData[0][24]	00	Eph data subframe 1	UINT8
33	SubFrameData[0][25]	00	Eph data subframe 1	UINT8
34	SubFrameData[0][26]	00	Eph data subframe 1	UINT8
35	SubFrameData[0][27]	00	Eph data subframe 1	UINT8
36~63	SubFrameData[1][0~27]	00	Eph data subframe 2, same as field 8-35	UINT8

64-91	SubFrameData[2][0~27]	00	Eph data subframe 3, same as field 8-35	UINT8
92	Binary command checksum	30	Binary message payload checksum	UINT8
93	Binary end byte	0D	Binary message end sequence byte #1	UINT8
94	Binary end byte	0A	Binary message end sequence byte #2	UINT8

- The binary command of AGPS warm start is as below (Binary messages are described in separate SkyTraq Application Notes, AN0003.)

SYSTEM RESTART – Force System to restart (0x1)

This is a request message which will reset and restart the GPS receiver. This command is issued from the host to GPS receiver and GPS receiver should respond with an ACK or NACK. The payload length is 15 bytes.

Structure:

<0xA0,0xA1>< PL><01>< message body><CS><0x0D,0x0A>

Example:

A0 A1 00 0F 01 04 07 DD 09 1B 06 29 1D 00 00 00 00 00 00 ff 0D 0A

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Field	Name	Example(hex)	Description	Type	Unit
1	Message ID	01		UINT8	-
2	Start Mode	04	00 = Reserved 01 = System Reset, Hot start 02 = System Reset, Warm start 03 = System Reset, Cold start 04 = AGPS Warm start	UINT8	
3-4	UTC Year	07DD	>= 1980	UINT16	
5	UTC Month	09	1 ~ 12	UINT8	
6	UTC Day	1B	1 ~ 31	UINT8	
7	UTC Hour	06	0 ~ 23	UINT8	
8	UTC Minute	29	0 ~ 59	UINT8	
9	UTC Second	1D	0 ~ 59	UINT8	
10-11	Latitude	0000	Between – 9000 and 9000 > 0: North Hemisphere < 0: South Hemisphere	SINT16	1/100 degree
12-13	Longitude	0000	Between – 18000 and 18000	SINT16	1/100

			> 0: East Hemisphere < 0: West Hemisphere		degree
14-15	Altitude	0000	Between –1000 and 18300	SINT16	Meter
Payload Length : 15 bytes					

Change Log

Ver 0.3 February 19, 2014
1. Added Venus 8

Ver 0.2 Sep. 27, 2013
1. Modify the ephemeris data to use Eph_4_Rom.dat
2. Modify the descriptions of ROM AGPS message flows
3. Add Warm start binary command

Ver 0.0.1, Dec 29, 2011

1. Initial release

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